REMARKS

The Office action of July 6, 2009, has been carefully considered.

Claims 14-15, 17-20, 22-23 and 27 have been rejected under 35 USC 102(b) as anticipated by Elmore et al, while Claims 24-26 have been rejected under 35 USC 103(a) as obvious over Elmore et al.

Claim 14 has been amended above to clarify the subject matter of the invention. Thus, the sonotrode has been defined as having a body portion and a head portion of greater diameter than the body portion, and the back surface of the head portion has been defined as including a tapered portion of gradually reducing diameter in the direction of the body portion, the back surface and tapered portion joining the working surface to the body portion. This structure can be seen clearly in Figures 1, 2, 4 and 5.

In addition, Claim 14 has been amended to recite that the reinforcement can also exhibit curved and protruding geometry, as is shown in Figure 4 of the application. While this geometry is thought to be generally triangular, it is described as "curved geometry" at page 6, line 1 of the specification.

In Elmore et al, Figure 1 shows a sonotrode in which the end portion is connected to a disk which vibrates. In the embodiment shown in Figure 3, the disk includes a protruding portion with triangular geometry, and this embodiment is alleged to anticipate the invention.

The amendment to Claim 14 clearly distinguishes over the structure shown in Elmore et al. As presently claimed, the back surface of the head portion of the sonotrode tapers in the direction of the body portion of the sonotrode, gradually reducing in diameter. This is opposite to the embodiment shown in Elmore et al, in which the body portion of the

sonotrode *reduces in diameter in the direction of the disk.*

Moreover, the sonotrode of Elmore et al functions in an entirely different manner from the sonotrode of the invention. According to the invention, the sonotrode is used for welding metal with a tip of the sonotrode in the antinode, the tip having an end face perpendicular to the longitudinal axis of the sonotrode, and the working surface used for welding being parallel to the longitudinal direction. In embodiments of this type, there is often a problem in that deflection of the sonotrode tip occurs, resulting in an inclination of the working or welding surfaces so that the working surfaces do not contact the material to be welded to the desired extent. In order to reduce the deflection of the working surface, a reinforcement is provided according to the invention, enabling the working surface to remain substantially parallel to the longitudinal axis of the sonotrode when the sonotrode is oscillating in the direction of the longitudinal axis.

In Elmore et al, the disk is dimensioned such that an antinode is provided both at the center, where the disk is connected to the sonotrode tip, and at the edge area. An oscillation node runs between the center and the edge, as disclosed at column 3, lines 32 et seq:

> ...we have found that the mode having one nodal circle at approximately the center of the disk's face and a vibratory loop at the center of the disk as well as a vibratory loop at the outer periphery of the disk is to be preferred.

Moreover, it is stated at column 6, lines 70-72 that a circular plate is preferred "having one nodal circle within its periphery with a vibratory loop at its center and a vibratory loop at its periphery."

Welding is conducted in Elmore et al via the disk periphery as shown in Figure 9. Regardless of the geometry of

the disk of Elmore et al, the disk must remain elastic in order to vibrate, as disclosed at column 7, lines 61-64:

> The resonant tip shown in Figures 2 through 6 have a thickness limitation since such tips, like the other tips of the vibratory device of the present invention, must remain elastic, in order to vibrate in the desired manner.

Elmore et al also states at column 7, line 73 to column 8, line 2, that

> Figure 7a illustrates the approximate vibratory motion of the tip of the present invention when it vibrates according to the mode of vibration providing one nodal diameter. Vibratory loop and nodal areas are clearly shown.

Figure 7a clearly shows the extent of the vibration of the disk, the disk edge clearly moving away from a position in which it is parallel with respect to the axis of the sonotrode. Such movements as are shown in Figure 7a are clearly prevented by the reinforcement according to the invention.

The oscillation behavior of the sonotrode according to the invention is different from that of Elmore et al. According to the invention, the tip is used as the working surface for welding (reference numerals 28, 30 in Figures 2-5) and the working surfaces are in the antinode of the sonotrode, whereas according to Elmore et al, the working surface is in the antinode of the disk connected to the sonotrode. The disk itself oscillates and has at least two antinodes.

The attached exhibit compares the disk oscillator of Elmore et al with the claimed invention. From this exhibit, it can ben seen that the disk of Elmore et al is oscillated such that at least two antinodes result. The working surface is positioned in a section of the outer periphery of the disk,

in the second antinode or loop. The tip of the sonotrode according to the invention, and hence the welding surface, is positioned in an antinode without oscillating relative to the sonotrode; tip and sonotrode are a unit oscillating synchronously. The tip of the sonotrode of Elmore et al and the periphery of the disk providing the working surface oscillate in opposite directions.

According to the teaching of the claimed invention, the working surface is always oriented along the sonotrode longitudinal direction so that a gap between the working surface and the parts to be welded is minimized and does not negatively influence the welding results. The gap is avoided by providing reinforcement on the front surface so that a deflection longitudinal to the longitudinal axis of the sonotrode is not possible.

As can be seen from the exhibit, as well as from Figure 7 of Elmore et al, a gap will always be created between the working surface of Elmore et al and the metals to be welded.

Withdrawal of these rejections is requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,

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